Montana
Office of Public Instruction
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# Science Model Teaching Unit
# What's in the Ecosystem in Your Neighborhood

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## Grade 4 - Approximate Duration: 6 hours

### Stage 1 Desired Results

**Established Goals**

**Science Content Standard 1:** Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate the results and form reasonable conclusions of scientific investigations.
**Benchmark 4.6:** Identify how observations of nature form an essential base of knowledge among the Montana American Indians.

**Science Content Standard 3:** Students, through the inquiry process, demonstrate knowledge of the characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.
**Benchmark 4.4:** Explain cause and effect relationships between nonliving and living components within ecosystems; and explain individual response to the changes in the environment including identify differences between inherited, instinctual, and learned behaviors.

**Essential Understanding 1:** There is great diversity among the 12 tribal Nations of Montana in their languages, cultures, histories and governments. Each Nation has a distinct and unique cultural heritage that contributes to modern Montana.

| Understandings | Essential Questions |
|---|---|
| • An ecosystem is made up of groups of living things and the environment they live in.<br>• The living and nonliving parts of the ecosystem interact with one another.<br>• Nature observations used by Montana Indians form an essential base of knowledge. | • What is an ecosystem?<br>• How would you describe the importance of each major part of an ecosystem?<br>• How do some Montana Indians learn about the environment? |



Indian Education
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*Science Grade 4 What's in the Ecosystem in Your Neighborhood (continued)*

| *Students will be able to…* | *Students will know…* |
|---|---|
| • explain why written or oral observations are an important tool of scientific inquiry.<br>• draw or describe an ecosystem classifying and labeling the living and nonliving parts.<br>• identify five plants and two insects in a neighborhood field ecosystem.<br>• compare and contrast their drawing with others in the classroom to see where they are similar and/or different. | • an ecosystem is made up of groups of living things and the environment they live in.<br>• the living and nonliving parts of the ecosystem interact and are dependent on one another.<br>• how to identify eight Montana native plants.<br>• nature observations used by some Montana Indians form an essential base understanding about plants, animals, and human relationships.<br>• it is important to respect living things in our environment. |

**Stage 2 Assessment Evidence**

**Performance Tasks**

- Create a drawing, with a partner, of a neighborhood ecosystem, identifying and labeling five plants, two insects and six non-living things. This task should be done through observation and study, rather than causing harm to the species being studied. Western scientific beliefs about living and non-living "things" are in contrast to some Native perspectives. "Nonliving" is a scientific term that labels items around the idea that items such as rocks, dirt, etc. are not alive.
- Identify and describe five interactions between things in the ecosystem.
- Shows respect for living things during the field observation by not picking plants for the purpose of careful observation and drawing.

**ECOSYSTEM EVALUATION**

Name _____

| ECOSYSTEM DRAWING | 0-20 points | 21-40 points | 41-60 points |
|---|---|---|---|
| Student Identifies and labels | 1-2 different plants<br>0 insects<br>0-3 "nonliving" things | 3-4 different plants<br>1 insect<br>4-5 "nonliving" things | 5 different plants 2 insects<br>6 "nonliving" things |
| Effort shown in drawings | Sloppy, little effort<br>Argues with partner, Unproductive | Readable, average effort<br>Cooperative most of time<br>Product missing minor parts | Neat and accurate<br>Cooperative<br>Complete product |
| ECOSYSTEM INTERACTIONS | 0-7 pts | 8-16 pts | 17-25 pts |
| Drawn or written description | 0-1 example<br>0-2 Little understanding | 2-3 examples<br>Average understanding | 4-5 examples<br>Excellent understanding |
| RESPECTS NATIVE AMERICAN UNDERSTANDINGS ABOUT LIVING THINGS | 0-7 pts | 8-16 pts | 17-25 pts |
| The Student | Picks plants<br>Little care in plant observing or drawing | Obeys rule but shows no other signs of understanding | Does not pick plants<br>Is careful when observing<br>Invests time in plant drawings |
| Combined Student Score<br>Ecosystem Drawing<br>Ecosystem Interaction<br>Respect for Traditional Native American Understandings About Living Things<br>Total | 50 pts _____<br>25 pts _____<br>25 pts _____<br><br><br>100 pts _____ | | |

**Student Self Evaluation**

***1. What parts of the assignment did you do well?***

***2.* What parts were hard for you?**

***3.* What did you do to help yourself when things were hard or you didn't understand?**

***4.* What are at least two things you learned from this unit?**

## Stage 3 Learning Plan

**Learning Activities**

**Day 1**

1. Begin with students turning to the chapter on Ecosystems in their science textbook. Use the text as the focus for a discussion of ECOSYSTEM and its meaning: Groups of living and nonliving things and the environment in which they live.

2. Ask questions such as:
   - *What are some living things?* Plants and animals
   - *What are some nonliving things that affect living things?* Sunlight, soil, air, water, temperature
   - *Why do you think it is important to study ecosystems?* Accept any reasonable answer

3. Explain to students that asking questions about something is one way we learn.

4. For this lesson, we are going to use two ways of studying nature. Hundreds of years ago, Montana Indians were experts in understanding ecosystems. Montana Indians knew which plants they could eat, which ones could heal sickness, and how to use plants respectfully so they would continue to grow and be available. Montana Indian understanding of plants and animals helped them survive for thousands of years.

One way Indian people learn about their environment is through observation or looking carefully at their surroundings. Joseph Bruchac says, "Today, few people make full use of their senses. Our Creator gave us each two ears and two eyes and only one mouth. That should remind us that listening and observing are twice as important as talking." (Bruchac, J., *Native American Games and Stories.* Fulcrum Publishing. 2000.)

Optional:

5. Read *Muskrat Will Be Swimming*, by Savageau.

6. After the story, ask these questions:
   - How did the girl in the story use her observation skills?
   - How was this important to her understanding of the lake and the animals that lived in the lake?

**Day 2**

As a class, students will engage in a game played by some American Indian people. This game is called 'The Rock Game" and can be found in *Native American Games and Stories,* by Joseph Bruchac. It is a game that will help students to practice using their senses.

**Teacher Preparation**: Divide class into small groups of 6-8 students. Prepare bowls of rocks, one rock for each student in that group. Find distinctive rocks, different from one another.
Note: teacher may want to label each rock with a symbol on masking tape. Just be sure that side is down when the students look for their rock. Prepare blindfolds for each student.
Blindfolds can be made by ripping strips from scrap cloth.

**Play**: Each small group sits in a circle on the floor and the teacher places one of the rock bowls in the center. Each student picks a rock from a bowl and is given 2-5 minutes to memorize it--look, feel, touch, smell (Remind students not to taste – as that is not an acceptable observation in science). They then put the rock back in the bowl and the teacher shakes the bowl pouring the rocks on the floor. The students have to use only their eyes and find their rock. When everyone has their rock, they must return the rock to the bowl and put on a blindfold. Then the teacher dumps the rocks out on the floor and each person must carefully crawl and find their rock without looking. When the game is finished, discuss why this game would help you observing ecosystems.

**Day 3**

1. Read the entire book *Between Earth & Sky, Legends of Native American Sacred Places*, by Joseph Bruchac and Thomas Locker.
2. Engage the class with a discussion of what they thought was important about this story.
   - What did Little Turtle learn from his uncle Old Bear? There are sacred places all around us respect for each other, for all living things
   - Is this something important for 4th graders? For grown-ups? Yes, for all people.
3. Show examples of plants they may find, help them make their own resource sheet to help them in the field study. Example: Foxtail grass has a soft "fox tail" on the top.

4. Explain students will be going on a "walking fieldtrip" and that they will work with respect for all living things by not to pick any plants on this field trip.
5. Hand out the clipboards and paper, have them get their pencils, assign partners and take them to the natural area where they will observe and record what they see. Assign spots and give the students 15-30 minutes to explore, observe, and record, making sure they date their information in the top right-hand corner of their paper. Students save their drawings for tomorrow's compiling of info and ecosystem drawing.

**Day 4**
**Ecosystem Walk**
Teacher Preparation

- Choose a natural field site to observe that is in close proximity to the classroom: Before taking the students out, the teacher should preview the area. Identify the plants, using a plant identification guide. One resource: *Rocky Mountain Wildflowers* by Craighead, Craighead, and Davis.
- Availability of plant species will impact the expectations established for the students in the evaluation.
- Prepare a paper grid and approximately section off the natural area site into 3'x 3' squares for student pairs to use for their identification and observation. You can do it mentally with landmarks in mind or stake out with stakes and string. Plan and record what partners will work together in which area. This grid will help the teacher place the finished drawing together to create a large ecosystem on a classroom bulletin board.
- Plan to talk to students about the respect some Native people have for living things. Many Native Americans hold the understanding that plants and animals are relatives and should treated with respect. What we do to the earth affects us and many other beings. Ask the students if picking plants that won't be used for food or medicine is showing respect for the ecosystem. Students will want to pick up things but emphasize this is a "watching and recording walk." For most plants, they will observe carefully with their eyes. Be aware of noxious weeds and never take flowers or seeds from them.
  Reference: Caduto and Bruchac provide an excellent summary of classifying and identifying plants in a traditional Native American approach on p. 20-24 of their book, *Keepers of Life, Discovering Plants Through Native American Stories and Earth Activities for Children.*
- Use guidebooks to identify plants or teacher can take digital photos to identify back in the classroom.
- This is a great opportunity to invite knowledgeable tribal experts to go with you and your class into the field for plant identification. You may begin by contacting the tribal college closest to your area: http://www.opi.mt.gov/indianed2/IEFALinks.html.
- Have several pieces of letter-size white copy paper on a clipboard for each student. Students will use this for drawing plants and writing notes.
- Make copies of the Ecosystem Evaluation sheet above and give it to each child to put on their clipboard. Explain this is how they will be assessed.

**Day 5**

**Ecosystem Cooperative Drawing**

1. In this day's lesson the students take their observation knowledge and create an ecosystem drawing with their partner on an 11"x14" sheet of paper. The partners will share notes and pictures of what they observed that was in their plot of the natural site.

2. Assign students to identify and label five plants, two insects, six nonliving things (this is keyed to the evaluation and is dependent upon what is available in the site you choose). Remind students that not all cultures consider things like rocks or water "nonliving."

3. An additional part of the assignment is to identify key nonliving parts: sunlight, soil, air, water, and temperature. Example: there is a lot of sun or mostly shade, soil is sandy or compacted, any signs of rain such as soil damp. Thermometers could be taken out to record the temperature that day.
   Remind students that because their observations were for yesterday, they must date their ecosystems creation with the same date.
   Ask, "How could you find out what it's like in winter in your ecosystem?" (Observe the area at least once a season.) Give the student teams about 30 minutes to finish their ecosystem drawings.

4. Teacher will take the student drawings and place them on a bulletin board to create a full picture of the ecosystem at the site from the previously drawn teacher matrix. Students compare and contrast what they see.
   Possible questions:
   What do you notice about the drawings? How are they different? How are they similar?
   What plants are in all sections? Are there any plants that are only in one or two sections? Are these sections close to one another? What does this tell us about seeds or reproduction? Are the insects the same? If different, why do you think they are? Are the soils and rocks the same? Are the "nonliving" things the same?

5. Yesterday we talked about "getting to know" some of our Montana plants. Is there anything you've learned about one of the plants since yesterday? Accept and note reasonable comments on the board.

**Day 6**

**Ecosystem Interactions**

1. Return to the natural area and discuss interactions between living and nonliving things in the area. Example: Point to a plant and pick up some soil. How does the soil help the plant? Gives it nutrients. Can any plant grow in this soil? No, there may be not enough or the right kind of nutrients.

2. Students should observe their 3'x 3' plot again and with their partner, write down at least five interactions between living and/or nonliving things. Give students 15-20 minutes to do this. Return to the classroom and using the bulletin board ecosystem, have each student come up and explain one interaction. After they are finished, the teacher collects and evaluates each page of interactions, recording the student's points on their evaluation sheet. Points are totaled and comments written on the evaluation sheet.

**Resources**

Bruchac, James and Joseph Bruchac, *Native American Games and Stories*. Golden: Fulcrum Press, 2000.

Bruchac, James and Thomas Locker, *Betweeen Earth & Sky.* New York: Harcourt, Inc., 1996.

Caduto, M., and Bruchac, James., *Keepers of Life, Discovering Plants Through Native American Stories and Earth Activities for Children.* Golden: Fulcum Press, 1998.

Craighead, John, Craighead, Frank and Ray Davis, *Rocky Mountain Wildflowers, Peterson Field Guides.* Boston: Houghton Mifflin Co., 1963.

Savageau, Cheryl (Abenaki), *Muskrat Will Be Swimming.* 1996, color illustrations; Seneca.